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Silvical Characteristics of Mockernut Hickory

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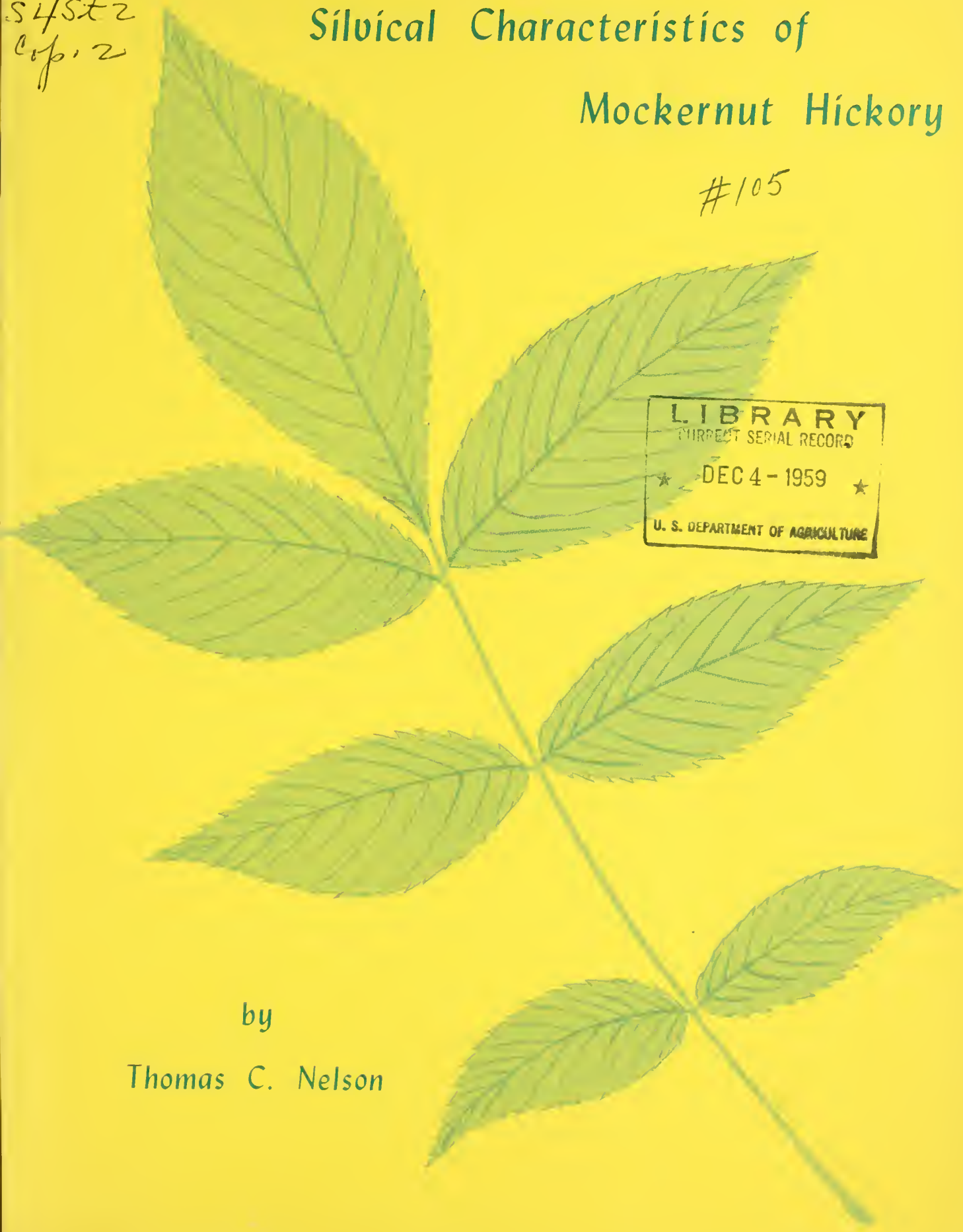

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Southeastern Forest Experiment Station
Asheville, North Carolina

Silvical Characteristics of Mockernut Hickory

(Carya tomentosa Nutt.)

by

Thomas C. Nelson
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Mockernut hickory (Carya tomentosa Nutt.), characteristically a southern species, is one of the commercially important true hickory species (16). This species is also referred to locally as bullnut, white hickory, white heart hickory, and hognut, although it loses its species name in the lumber trade and is marketed as "hickory" (8). "Big bud" is another local designation (2).

Although mockernut is distributed from southern Ontario southward (9), it is not common north of southeastern Pennsylvania and New Jersey. It becomes more abundant southward through Virginia, North Carolina, and Florida where it is the commonest of the hickories and furnishes the bulk of the hickory cut. This species is abundant in the lower Mississippi Valley and reaches its largest size in the basin of the lower Ohio River and in Missouri and Arkansas. Mockernut is the only hickory found in the pine forests of the sandy maritime pine belt of the Southern states (9). In the northern part of its range, it is mainly confined to the coastal region (6). The general range is shown in figure 1.

Mockernut hickory is used for tool handles requiring high shock resistance (fig. 2). It is also used for ladder rungs, athletic goods, agricultural implements, dowels, gymnasium apparatus, poles, shafts, well pumps, and furniture. Lower grade lumber is useful for pallets, blocking, and similar items (16).

HABITAT CONDITIONS

CLIMATIC

Mockernut hickory grows in a climate generally classified as humid by Thornthwaite (13). Mean annual precipitation ranges from 30 to 60 inches within the range of the species. Twenty to 30 inches of rain falls during the growing season. Forty inches of snowfall per year is not uncommon in the northern portion of the range, but snowfall is a rarity at the southern extreme (7).

Average annual temperatures range from 45° to 70° F.; average July temperatures from 70° to 80°; and average January temperatures from 20° to 55°. Extremes of 115° and -40° have been recorded within its range. The growing season is as short as 120 days in the northern portion of the range and as long as 320 days in the southern portion (7).

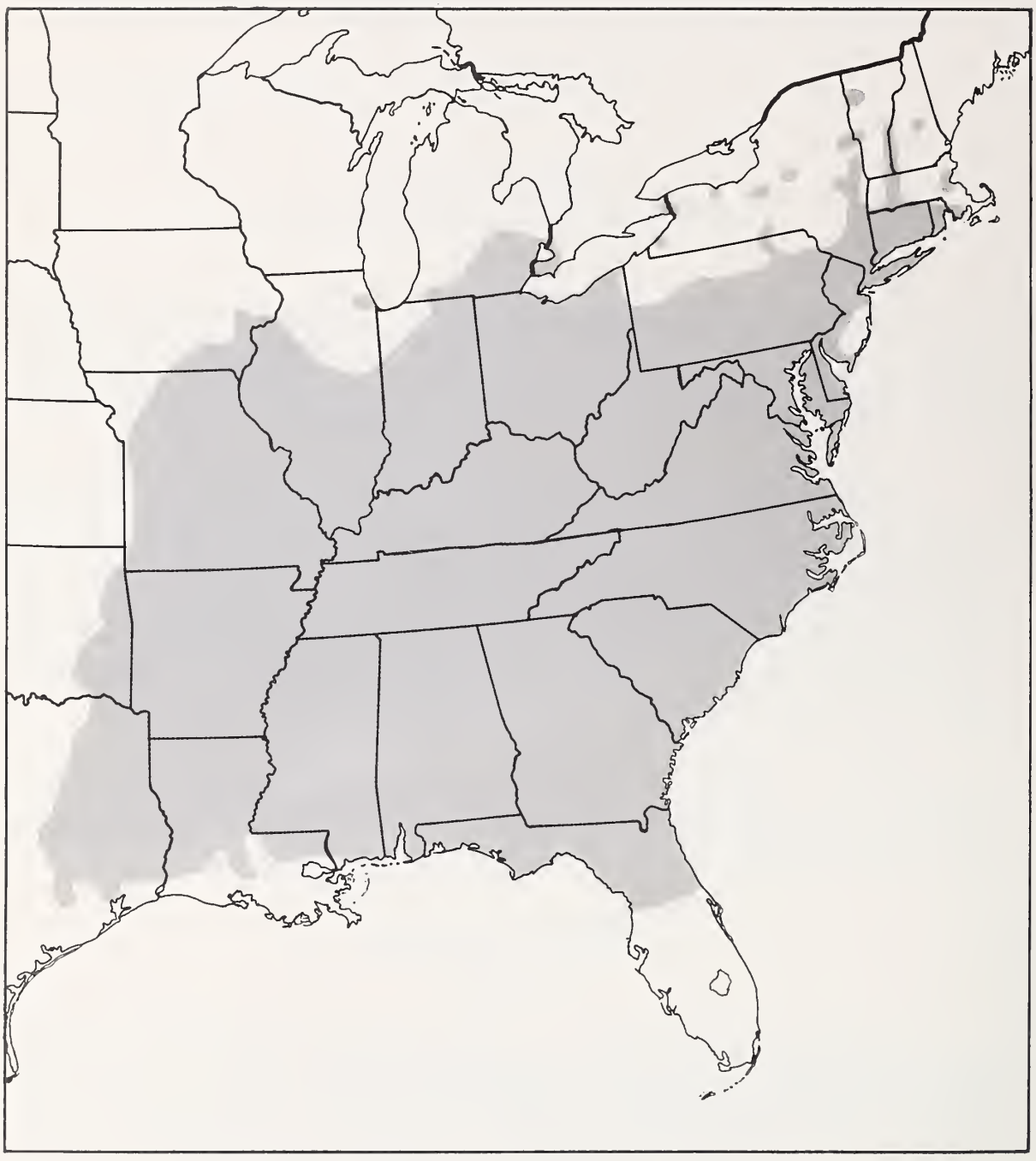

Figure 1.--Botanical range of mockernut hickory.

Figure 2.--Mockernut bolts at hickory mill near Macon, Georgia.

EDAPHIC AND PHYSIOGRAPHIC

As is characteristic of many hickory species, the preferred site for mockernut hickory varies within its range. In the north, it grows on the better ridge and hillside soils and, less frequently, on the alluvial bottoms (19). In the Cumberland Mountains and the hills of southern Indiana, mockernut grows in dry situations, such as south and west slopes or dry ridges. Stunted mockernut grows in Alabama and Mississippi upon the sandy shortleaf and loblolly pine land. The species is also found as a dwarf in company with yaupon (Ilex vomitoria) and live oak (Quercus virginiana) along the sand dunes of South Carolina (5); here the dwarfing is probably due to environmental conditions. However, most of the merchantable mockernut grows on moderately fertile uplands, and attains its best development only on fresh, deep fertile soil (2).

BIOTIC

Mockernut hickory is usually found as a component of the eastern oak-hickory forest although it also occurs in beech-maple forests (fig. 3). It is a major component of the northern red oak-mockernut hickory-sweetgum type and an associate of four other forest types (11).

Figure 3.--A forest-grown mockernut hickory, located in the University of Georgia Watson Springs School Forest. The tree is 101 feet high and measures 22.5 inches d.b.h.

The common associates of mockernut hickory vary widely for selected locations throughout its range (table 1).

Table 1.--Associates of mockernut hickory in selected sections of its range

Region	Associated species	Authority
New England Coastal Plain	Oaks (Quercus spp.) Eastern redcedar (Juniperus virginiana) Sassafras (Sassafras albidum) Sweet birch (Betula lenta) Sweetgum (Liquidambar styraciflua) Yellow-poplar (Liriodendron tulipifera)	Hough (6)
Cumberland Plateau	White oak (Quercus alba) Black oak (Quercus velutina) Post oak (Quercus stellata) Shagbark hickory (Carya ovata) Yellow-poplar Flowering dogwood (Cornus florida) Shortleaf pine (Pinus echinata) Pitch pine (Pinus rigida)	Braun (3)
Piedmont Lowland	White oak Northern red oak (Quercus rubra) Black oak Shagbark hickory	Braun (3)
Piedmont Upland	Loblolly pine (Pinus taeda) Longleaf pine (Pinus palustris) Shortleaf pine Southern red oak (Quercus falcata) Post oak Black oak Pignut hickory (Carya glabra) Flowering dogwood	Braun (3)
Southern Bottomland Hardwood Region	Swamp chestnut oak (Quercus michauxii) White oak Delta post oak (Quercus stellata var. mississippiensis) Nuttall oak (Quercus nuttallii) Water oak (Quercus nigra) Sweetgum American elm (Ulmus americana) Green ash (Fraxinus pennsylvanica) White ash (Fraxinus americana) Winged elm (Ulmus alata) Black tupelo (Nyssa sylvatica)	Westveld (18)

LIFE HISTORY

SEEDING HABITS

Flowering and fruiting.--Like the other hickories, the flowers of mockernut hickory are borne in separate flowers on the same tree (monoecious). The male catkins are four or five inches in length, with slender stems and common peduncles coated with matted hairs. Female flowers are produced in crowded two- to five-flowered spikes (9).

Mockernut flowers open from early April in southern Florida to the end of May in eastern New England (9). Fruit ripens in September and October, and seed dispersal occurs from September through December (15) (fig. 4).

Seed production.-- Mockernut hickory requires a minimum of 25 years to reach commercial seed-bearing age. Optimum seed production occurs from 40 to 125 years, and the maximum age listed for commercial seed production is 200 years (15).

Good seed crops occur every 2 to 3 years with light seed crops borne in the intervening years (15). Approximately 50 to 75 percent of fresh seed will germinate (12). Hickory shuckworm (Laspeyresia caryana) is probably a major factor in reducing germination.

Mockernut hickory, although seldom cultivated for fruit production, produces sweet, tasty nuts which are edible by humans, and the fruit forms a portion of the diet of racoon (Procyon lotor), red squirrel (Sciurus hudsonicus), eastern gray squirrel (Sciurus carolinensis), eastern fox squirrel (Sciurus niger), and eastern chipmunk (Tamias striatus). The twigs and young stems of mockernut hickory are browsed by white-tailed deer (Odocoileus virginianus) (17).

Seed dissemination.--Mockernut is one of the heaviest seeded species of Carya, averaging 90 seed per pound (15). The seed is disseminated mainly through gravity and by various species of squirrels.

VEGETATIVE REPRODUCTION

There is ample evidence in the literature on the ability of the genus Carya to sprout prolifically (2). Although mockernut hickory is not specifically mentioned, casual observation indicates that it will sprout prolifically following fire and cutting.

SEEDLING DEVELOPMENT

Establishment.--Hickories, in general, require a moderately moist seed bed for satisfactory seed germination (18), and mockernut appears to reproduce best in moist duff.

Young mockernut hickories are very susceptible to frost. This factor has proved an obstacle to its introduction into Germany (2).

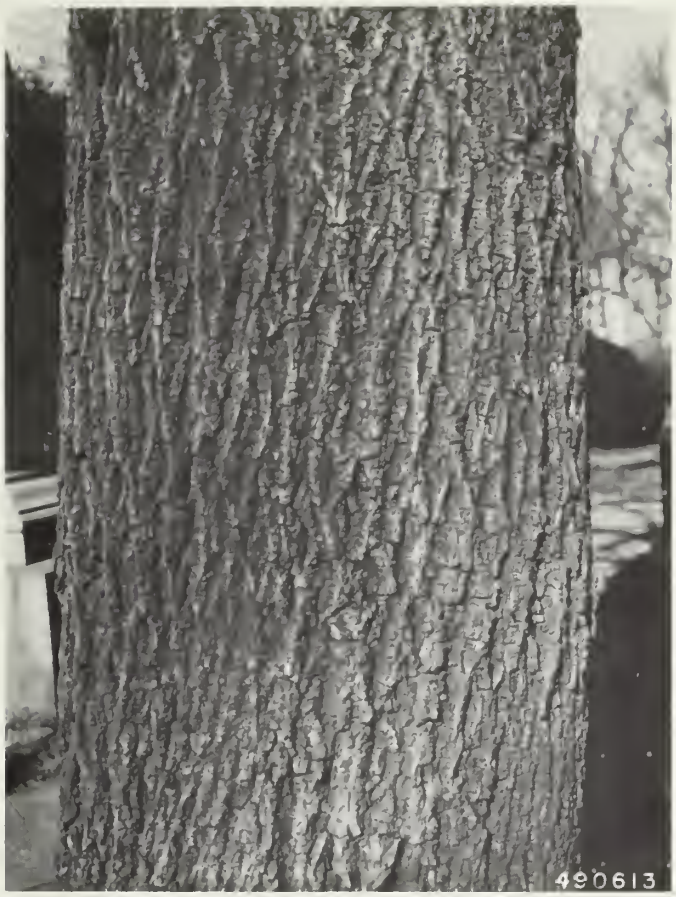

Figure 4.--Typical bark, fruit, twig and bud, and leaves of mockernut hickory.

Early growth.--Height growth of mockernut seedlings is slower than the growth of its associates. Boisen and Newlin (2) report the following height growth of seedlings in the Ohio Valley in the open or under light shade, on red clay soil:

Age (Years)	Height (Inches)
1	3.0
2	4.7
3	8.0
4	12.5
5	20.0
6	28.0

SAPLING STAGE TO MATURITY

Growth and yield.--Mockernut hickory seldom reaches 100 feet in height or 3 feet in diameter; it is usually much smaller (6, 7). Height growth in relation to age is shown in table 2.

Table 2.--Height growth of mockernut hickory in the Cumberland Mountains and Mississippi Valley (2)

Age (years)	Height	
	Cumberland Mountains	Mississippi Valley
	Feet	Feet
10	4	9
20	17	18
30	26	25
40	33	30
60	45	40
80	55	49
100	66	57
120	76	65
160	94	80
200	109	95

The current annual growth of mockernut hickory in dry situations is estimated at 15 cubic feet per acre per year. In fully stocked stands on soils of moderate fertility, 30 cubic feet per acre per year is a safe estimate, although growth rates of 44 cubic feet per acre per year are reported from Ohio (2).

Reaction to competition.--Mockernut hickory is classified as intolerant by Zon and Graves (19). However, Boisen and Newlin (2) state that a peculiar tolerance feature of the hickories is the remarkable rapidity with which they recover from suppression. It is probably a climax species on the moist sites upon which it occurs.

Principal enemies.--Mockernut hickory, like most hickories, is extremely susceptible to damage by woods fires (16).

It is host to several leaf and twig fungi, which cause little serious damage other than varying degrees of defoliation. Leaf blotch (Mycosphaerella dendroides), anthracnose (Gnomonia caryae), witches' broom (Microstroma juglandis), and scab

(Cladosporium effusum) are probably the most common. Phomopsis tumor is widespread on hickories and probably occurs on mockernuts (4). In common with most hardwoods, mockernut is susceptible to progressive heart rot caused by several fungi which often gain entrance into the tree through fire wounds.

A trunk rot caused by Poria spiculosa causes serious downgrading of hickory trees and logs. Nectria galligena, a bark canker, and Clitocybe parasitica, a root rot, have also been reported on mockernut hickory (14).

Although mockernut hickory is often and repeatedly subjected to serious damage by insects, there are relatively few insects which have been reported as specifically attacking mockernut. The hickory bark beetle (Scolytus quadrispinosus), the hickory spiral borer (Agrilus arcuatus var. torquatus), and the pecan carpenterworm (Cossula magnifica) are among the more serious insect enemies of mockernut. The hickory bark beetle probably destroys more mockernut trees of sawtimber size than any other insect. The hickory spiral borer kills many seedlings and young trees, and the pecan carpenterworm downgrades both trees and logs (1). The hickory twig girdler (Oncideres cingulatus) attacks both small and large trees.

Although Datana angusii, a defoliating caterpillar, attacks mockernut, it is probably of little economic importance. A number of other insects, including Neoclytus mucronatus, Platypus compositus, and Tremex columba attack weak, dying, or dead mockernut hickory (1).

RACES AND HYBRIDS

There is no information on the existence of geographic races in mockernut hickory. Smith (10), in discussing the genetics of hickory, indicates that mockernut is a tetraploid.

Mockernut hickory crosses naturally with pecan (Carya illinoensis) to form Schneck hickory (Carya x schneckii Sarg.) in Illinois and Iowa (8).

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